MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

BMS1024 – MANAGERIAL STATISTICS

(All sections / Groups)

12 AUGUST 2022
9.00 am – 11.00 am
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **ELEVEN (11)** printed pages with:
   Section A: Ten (10) multiple choice questions (20%)
   Section B: Three (3) structured questions (80%)

2. Answer **ALL** questions.

3. Answer **Section A** in the multiple-choice answer sheet provided and **Section B** in the answer booklet provided.

4. Statistical tables are attached at the end of the question paper.

5. Students are allowed to use non-programmable scientific calculators with no restrictions.

SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS)

There are TEN (10) questions in this section. Answer ALL questions on the multiple-choice answer sheet.

1. In a perfectly symmetrical distribution,
   A. the median equals the mean.
   B. the range equals the interquartile range.
   C. the interquartile range equals the mean.
   D. the variance equals the standard deviation.

2. The following data represents the daily sales of Melon TVs over a random sample of five business days.:

7	2	6	6	4

   Calculate the variance of the above sample.
   A. 7
   B. 4
   C. 2
   D. 6

3. The average salary for a sales representative in a medical billing company is $46,600 with a standard deviation of $6,400. The coefficient of variation for salaries at this company is
   A. 17.33%
   B. 15.89%
   C. 13.73%
   D. 11.19%

4. You were told that the first, second and third quartiles of female students' weight at a major university are 45kg, 65kg, and 90kg. What percentage of the students weigh between 45kg and 90kg?
   A. 25%
   B. 75%
   C. 100%
   D. 50%

5. In perfectly symmetrical distributions, which of the following is NOT a correct statement?
   A. The distance from Q1 to Q2 is the full distance from the smallest to the largest observation.
   B. The distance from Q1 to Q2 equals the distance from Q2 to Q3.
   C. The distance from the smallest observation to Q1 is the same as the distance from Q3 to the largest observation.
   D. The distance from the smallest observation to Q2 is the same as the distance from Q2 to the largest observation.

Continued...

6. A random sample of 30 business students required an average of 43.4 minutes to complete a statistics exam. Assume that the population standard deviation to complete the exam was 8.7 minutes. The 99% confidence interval around this sample mean is _____.
   A. (36.3, 50.5)
   B. (39.3, 47.5)
   C. (40.5, 46.3)
   D. (37.1, 49.8)

7. Steve's average golf score at his local course is 93.6 from a random sample of 34 rounds of golf. Assume that the population standard deviation for his golf score is 4.2. The margin of error for a 95% confidence interval around this sample mean is _____.
   A. 0.92
   B. 1.18
   C. 1.41
   D. 1.68

8. When calculating a confidence interval for the mean with a known population standard deviation, the _____ is used.
   A. Poisson distribution
   B. Binomial distribution
   C. Weibull distribution
   D. Normal distribution

9. The U.S. Department of Labor wants to estimate the percentage of females in the labor force to within ±5% with 90% confidence level. As a planning value they use 46% of proportion, the reported percentage of females in the labor force of EU (European Union) countries. How many employment records should be sampled?
   A. 269
   B. 260
   C. 46
   D. 54

10. In estimation, increasing the level of confidence desired will _____.
   A. tighten the confidence interval
   B. increase the margin of error
   C. decrease the margin of error
   D. increase precision

Continued...

SECTION B: STRUCTURED QUESTIONS (80 MARKS)

There are THREE questions in this section. Candidates MUST answer ALL THREE questions.

Question 1 (25 Marks)

(a) During the peak fishing months, a marina at a large man-made reservoir noted that boats were arriving at the average of 3.2 boats every twenty minutes to use the boat ramp. Let x be the number of boats arriving during the next twenty minutes

(i) What is the probability that during the next sixty minutes the number of boats arriving to use the boat ramp is exactly three?

(3 marks)

(ii) Find the probability that during the next ten minutes the number of boats arriving to use the boat ramp is at least one.

(4 marks)

(b) A contractor has submitted bids on three state jobs: an office building, a theater and a parking garage. If this contractor is awarded any of these jobs, the profits earned from these contracts are RM 1000 from the office building, RM 500 from the theater and RM 200 from the parking garage. His profit is zero if he did not obtain any of the contracts. The contractor estimates that the probabilities of getting the office building contract, the theater contract and the parking garage contract are 0.15, 0.30 and 0.45 respectively.

(i) Let x be the random variable which represents the contractor's profits in Ringgit Malaysia. Write the probability distribution of x. **(3 marks)**

(ii) Determine the mean of the probability distribution of contractor's profits.

(3 marks)

(iii) Calculate the probability of the contractors will be offered two contracts which are, the office building and the parking garage. **(3 marks)**

(c) A political telephone survey of 360 people asked whether they were in favour, undecided or not in favour of a proposed law. Each person was identified as either Republican or Democrat. The results are shown in the following table:

Party	In favour	Not in favour	Undecided	Total
Republican	98	54	40	192
Democrat	79	29	60	168
Total	177	83	100	360

Continued...

(i) What is the probability that a randomly selected respondent was in favour of the proposed law? **(2 marks)**

(ii) What is the probability that a randomly selected respondent was Democrat and undecided of the proposed law? **(3 marks)**

(iii) If a Republican was selected, find the probability he or she is not in favour of the proposed law. **(4 marks)**

Question 2 (25 Marks)

(a) A firm is studying the delivery times of its raw material from two suppliers. The firm is basically satisfied with supplier A and decides to stay with that supplier if the mean delivery time is less than supplier B. However, if the firm finds that the mean delivery time of supplier B is less than supplier A, it will begin dealing to purchase raw material from supplier B.

Supplier A	**Supplier B**
$n_1 = 20$	$n_2 = 20$
$\bar{x}_1 = 14 \quad days$	$\bar{x}_2 = 12.5 \quad days$
$s_1 = 3 \quad days$	$s_2 = 2 \quad days$

At 5% level of significance, what is the recommendation in terms of supplier selection?

(15 marks)

(b) A smartphone provider has the business objective of wanting to estimate the proportion of subscribers who would upgrade to a new smartphone with improved features if it were made available at a substantially reduced cost. Data are collected from a random sample of 600 subscribers. The results indicate that 450 of the subscribers would upgrade to a new smartphone at a reduced cost. At the 5% level of significance, is there evidence that more than 65% of the subscribers would upgrade to a new smartphone at reduced cost?

(10 marks)

Continued...

Question 3 (30 Marks)

(a) Sarah is the officer manager for a group of financial advisors who provide financial services for individual clients. She would like to investigate whether a relationship exists between the number of presentations made to prospective clients in a month and the number of new clients per month. The following table shows the number of presentations and corresponding number of new clients for a random sample of eight financial advisors. In addition, an excel summary output is provided as below:

Number of Presentations	Number of New Clients
7	2
9	3
9	4
10	3
11	5
12	3
8	3
7	4

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3127
R Square	0.0978
Adjusted R Square	0.0525
Standard Error	0.9399
Observations	8

ANOVA

	df	*SS*	*MS*	*F*
Regression	1	0.574453552	0.574453552	0.650257732
Residual	6	5.300546448	0.883424408	
Total	7	5.875		

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.9290	1.8237	1.05768	0.33091
Number of Presentations	0.1585	0.19651	0.80638	0.45079

Continued...

(i) Which variable is dependent? Which one is the independent variable?

(2 marks)

(ii) Determine the estimated least squares regression line between these two variables.

(4 marks)

(iii) What do the slope coefficient tell you about the relationship between the two variables? **(3 marks)**

(iv) Determine the correlation coefficient between the number of presentations made and the number of new clients. Interpret the coefficient.

(4 marks)

(v) Predict the number of new clients per month if the number of presentations made is 15. Explain the reliability of the prediction.

(4 marks)

(vi) State and interpret the coefficient of determination.

(3 marks)

(b) The table below, shows the portfolio shares in Companies A, B, C and D:

Company	January 2000		January 1999	
	Price (MYR)	Quantity	Price (MYR)	Quantity
A	3	40	1	25
B	3.60	10	1.20	50
C	4.80	10	1.60	50
D	6	40	2	25

Determine the Fisher's Ideal Price Index for January 2000 by using the January 1999 as the base year.

(10 marks)

End of Questions.

A. STATISTICAL FORMULAE

A. DESCRIPTIVE STATISTICS

Mean $(\bar{x}) = \frac{\sum_{i=1}^{n} X_i}{n}$

Standard Deviation $(s) = \sqrt{\frac{\sum_{i=1}^{n} X_i^2}{n-1} - \frac{(\sum_{i=1}^{n} X_i)^2}{n(n-1)}}$

Coefficient of Variation $(CV) = \frac{\sigma}{\bar{X}} \times 100$

Pearson's Coefficient of Skewness $(S_k) = \frac{3(\bar{X} - Median)}{s}$

B. PROBABILITY

P (A or B) = P (A) + P (B) – P (A and B)

P (A and B) = P (A)× P (B) if A and B are independent

P (A | B) = P (A and B) ÷ P (B)

Poisson Probability Distribution

If X follows a Poisson Distribution , $P(\lambda)$ where $P(X = x) = \frac{e^{-\lambda}\lambda^x}{x!}$

then the mean = $E(X) = \lambda$ and variance = $VAR(X) = \lambda$

Binomial Probability Distribution

If X follows a Binomial Distribution B(n, p) where $P(X = x) = {}^nC_x p^x q^{n-x}$

then the mean = $E(X) = np$ and variance = $VAR(X) = npq$ where $q = 1 - p$

Normal Distribution

If X follows a Normal distribution, $N(\mu, \sigma)$ where $E(X) = \mu$ and $VAR(X) = \sigma^2$

then $Z = \frac{X - \mu}{\sigma}$

C. EXPECTATION AND VARIANCE OPERATORS

$E(X) = \Sigma[X \bullet P(X)]$

$VAR(X) = E(X^2) - [E(X)]^2$ where $E(X^2) = \Sigma[X^2 \bullet P(X)]$

If $E(X) = \mu$ then $E(cX) = c\,\mu$, $E(X_1 + X_2) = E(X_1) + E(X_2)$

If $VAR(X) = \sigma^2$ then $VAR(cX) = c^2\,\sigma^2$,

$VAR(X_1 + X_2) = VAR(X_1) + VAR(X_2) + 2\,COV(X_1, X_2)$

where $COV(X_1, X_2) = E(X_1 X_2) - [E(X_1)\,E(X_2)]$

D. CONFIDENCE INTERVAL ESTIMATION AND SAMPLE SIZE DETERMINATION

(100 – α) % Confidence Interval for Population Mean (σ Known) = $\mu = \overline{X} \pm Z_{\alpha/2}\left(\sigma/\sqrt{n}\right)$ (100 – α)% Confidence Interval for Population Mean (σ Unknown) = $\mu = \overline{X} \pm t_{\alpha/2,n-1}\left(s/\sqrt{n}\right)$
(100 – α)% Confidence Interval for Population Proportion $= \hat{p} \pm Z_{\alpha/2}\sigma_{p^\wedge}$ Where $\sigma_{\hat{p}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
Sample Size Determination for Population Mean $= n \geq \left[\frac{(Z_{\alpha/2})\sigma}{E}\right]^2$ Sample Size Determination for Population Proportion $= n \geq \frac{(Z_{\alpha/2})^2\,\hat{p}(1-\hat{p})}{E^2}$ Where E = Limit of Error in Estimation

E. HYPOTHESIS TESTING

One Sample Mean Test	
Standard Deviation (σ) Known	**Standard Deviation (σ) Not Known**
$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$	$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$
One Sample Proportion Test	
$z = \frac{\hat{p} - p}{\sigma_p}$ where $\sigma_p = \sqrt{\frac{p(1-p)}{n}}$	
Two Sample Mean Test	
Standard Deviation (σ) Known $z = \frac{(\overline{x_1} - \overline{x_2}) - (\mu_1 - \mu_2)}{\sqrt{\sigma_1^2/n_1 + \sigma_2^2/n_2}}$	**Standard Deviation (σ) Not Known** $t = \frac{(\overline{x_1} - \overline{x_2}) - (\mu_1 - \mu_2)}{\sqrt{S_p^2\left(1/n_1 + 1/n_2\right)}}$ where $S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 + n_2 - 2)}$
Two Sample Proportion Test	
$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{p(1-p)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$ where $p = \frac{X_1 + X_2}{n_1 + n_2}$ *where X_1 and X_2 are the number of successes from each population*	

F. REGRESSION ANALYSIS

Simple Linear Regression

Population Model: $Y = \beta_0 + \beta_1 X_1 + \varepsilon$

Sample Model: $\hat{y} = b_0 + b_1 x_1 + e$

Correlation Coefficient

$$r = \frac{\sum XY - \left[\frac{\sum X \sum Y}{n}\right]}{\sqrt{\left[\sum X^2 - \left(\frac{(\sum X)^2}{n}\right)\right]\left[\sum Y^2 - \left(\frac{(\sum Y)^2}{n}\right)\right]}} = \frac{COV(X,Y)}{\sigma_X \sigma_Y}$$

ANOVA Table for Regression

Source	Degrees of Freedom	Sum of Squares	Mean Squares
Regression	*1*	SSR	MSR = SSR/1
Error/Residual	$n-2$	SSE	MSE = SSE/$(n-2)$
Total	$n-1$	SST	

Test Statistic for Significance of the Predictor Variable

$t_i = \frac{b_i}{S_{b_i}}$ and the critical value $= \pm t_{\alpha/2,(n-p-1)}$

Where p= number of predictor

G. INDEX NUMBERS

Simple Price Index

$P = \frac{p_t}{p_0} \times 100$

Aggregate Price Index

$P = \frac{\sum p_t}{\sum p_0}(100)$

Laspeyres Price Index

$P = \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$

Paasche Price Index

$P = \frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$

Laspeyres Quantity Index

$P = \frac{\sum p_0 q_t}{\sum p_0 q_0} \times 100$

Paasche Quantity Index

$P = \frac{\sum p_t q_t}{\sum p_t q_0} \times 100$

Fisher's Ideal Price Index

$\sqrt{(Laspeyres\ \ Price\ Index)(Paa\ sche\ Price\ Index)}$

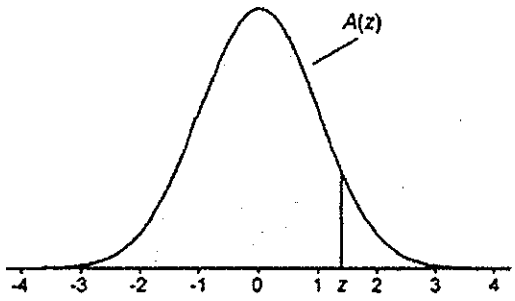
Value Index

$V = \frac{\sum p_t q_t}{\sum p_0 q_0} \times 100$

B. STATISTICAL TABLE

TABLE A.1

Cumulative Standardized Normal Distribution



$A(z)$ is the integral of the standardized normal distribution from $-\infty$ to z (in other words, the area under the curve to the left of z). It gives the probability of a normal random variable not being more than z standard deviations above its mean. Values of z of particular importance:

z	$A(z)$	
1.645	0.9500	Lower limit of right 5% tail
1.960	0.9750	Lower limit of right 2.5% tail
2.326	0.9900	Lower limit of right 1% tail
2.576	0.9950	Lower limit of right 0.5% tail
3.090	0.9990	Lower limit of right 0.1% tail
3.291	0.9995	Lower limit of right 0.05% tail

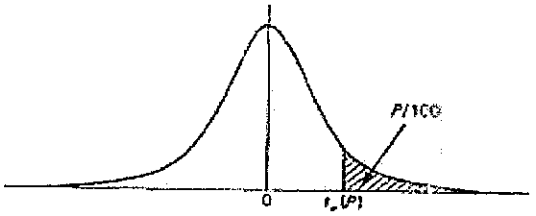
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999							

TABLE 10. PERCENTAGE POINTS OF THE t-DISTRIBUTION

This table gives percentage points $t_\nu(P)$ defined by the equation

$$\frac{P}{100} = \frac{1}{\sqrt{\nu\pi}} \frac{\Gamma(\frac{1}{2}\nu+\frac{1}{2})}{\Gamma(\frac{1}{2}\nu)} \int_{t_\nu(P)}^{\infty} \frac{dt}{(1+t^2/\nu)^{\frac{1}{2}(\nu+1)}}.$$

Let X_1 and X_2 be independent random variables having a normal distribution with zero mean and unit variance and a χ^2-distribution with ν degrees of freedom respectively; then $t = X_1/\sqrt{X_2/\nu}$ has Student's t-distribution with ν degrees of freedom, and the probability that $t \geqslant t_\nu(P)$ is $P/100$. The lower percentage points are given by symmetry as $-t_\nu(P)$, and the probability that $|t| \geqslant t_\nu(P)$ is $2P/100$.



The limiting distribution of t as ν tends to infinity is the normal distribution with zero mean and unit variance. When ν is large interpolation in ν should be harmonic.

P	40	30	25	20	15	10	5	2·5	1	0·5	0·1	0·05
$\nu = 1$	0·3249	0·7265	1·0000	1·3764	1·963	3·078	6·314	12·71	31·82	63·66	318·3	636·6
2	0·2887	0·6172	0·8165	1·0607	1·386	1·886	2·920	4·303	6·965	9·925	22·33	31·60
3	0·2767	0·5844	0·7649	0·9785	1·250	1·638	2·353	3·182	4·541	5·841	10·21	12·92
4	0·2707	0·5686	0·7407	0·9410	1·190	1·533	2·132	2·776	3·747	4·604	7·173	8·610
5	0·2672	0·5594	0·7267	0·9195	1·156	1·476	2·015	2·571	3·365	4·032	5·893	6·869
6	0·2648	0·5534	0·7176	0·9057	1·134	1·440	1·943	2·447	3·143	3·707	5·208	5·959
7	0·2632	0·5491	0·7111	0·8960	1·119	1·415	1·895	2·365	2·998	3·499	4·785	5·408
8	0·2619	0·5459	0·7064	0·8889	1·108	1·397	1·860	2·306	2·896	3·355	4·501	5·041
9	0·2610	0·5435	0·7027	0·8834	1·100	1·383	1·833	2·262	2·821	3·250	4·297	4·781
10	0·2602	0·5415	0·6998	0·8791	1·093	1·372	1·812	2·228	2·764	3·169	4·144	4·587
11	0·2596	0·5399	0·6974	0·8755	1·088	1·363	1·796	2·201	2·718	3·106	4·025	4·437
12	0·2590	0·5386	0·6955	0·8726	1·083	1·356	1·782	2·179	2·681	3·055	3·930	4·318
13	0·2586	0·5375	0·6938	0·8702	1·079	1·350	1·771	2·160	2·650	3·012	3·852	4·221
14	0·2582	0·5366	0·6924	0·8681	1·076	1·345	1·761	2·145	2·624	2·977	3·787	4·140
15	0·2579	0·5357	0·6912	0·8662	1·074	1·341	1·753	2·131	2·602	2·947	3·733	4·073
16	0·2576	0·5350	0·6901	0·8647	1·071	1·337	1·746	2·120	2·583	2·921	3·686	4·015
17	0·2573	0·5344	0·6892	0·8633	1·069	1·333	1·740	2·110	2·567	2·898	3·646	3·965
18	0·2571	0·5338	0·6884	0·8620	1·067	1·330	1·734	2·101	2·552	2·878	3·610	3·922
19	0·2569	0·5333	0·6876	0·8610	1·066	1·328	1·729	2·093	2·539	2·861	3·579	3·883
20	0·2567	0·5329	0·6870	0·8600	1·064	1·325	1·725	2·086	2·528	2·845	3·552	3·850
21	0·2566	0·5325	0·6864	0·8591	1·063	1·323	1·721	2·080	2·518	2·831	3·527	3·819
22	0·2564	0·5321	0·6858	0·8583	1·061	1·321	1·717	2·074	2·508	2·819	3·505	3·792
23	0·2563	0·5317	0·6853	0·8575	1·060	1·319	1·714	2·069	2·500	2·807	3·485	3·768
24	0·2562	0·5314	0·6848	0·8569	1·059	1·318	1·711	2·064	2·492	2·797	3·467	3·745
25	0·2561	0·5312	0·6844	0·8562	1·058	1·316	1·708	2·060	2·485	2·787	3·450	3·725
26	0·2560	0·5309	0·6840	0·8557	1·058	1·315	1·706	2·056	2·479	2·779	3·435	3·707
27	0·2559	0·5306	0·6837	0·8551	1·057	1·314	1·703	2·052	2·473	2·771	3·421	3·690
28	0·2558	0·5304	0·6834	0·8546	1·056	1·313	1·701	2·048	2·467	2·763	3·408	3·674
29	0·2557	0·5302	0·6830	0·8542	1·055	1·311	1·699	2·045	2·462	2·756	3·396	3·659
30	0·2556	0·5300	0·6828	0·8538	1·055	1·310	1·697	2·042	2·457	2·750	3·385	3·646
32	0·2555	0·5297	0·6822	0·8530	1·054	1·309	1·694	2·037	2·449	2·738	3·365	3·622
34	0·2553	0·5294	0·6818	0·8523	1·052	1·307	1·691	2·032	2·441	2·728	3·348	3·601
36	0·2552	0·5291	0·6814	0·8517	1·052	1·306	1·688	2·028	2·434	2·719	3·333	3·582
38	0·2551	0·5288	0·6810	0·8512	1·051	1·304	1·686	2·024	2·429	2·712	3·319	3·566
40	0·2550	0·5286	0·6807	0·8507	1·050	1·303	1·684	2·021	2·423	2·704	3·307	3·551
50	0·2547	0·5278	0·6794	0·8489	1·047	1·299	1·676	2·009	2·403	2·678	3·261	3·496
60	0·2545	0·5272	0·6786	0·8477	1·045	1·296	1·671	2·000	2·390	2·660	3·232	3·460
120	0·2539	0·5258	0·6765	0·8446	1·041	1·289	1·658	1·980	2·358	2·617	3·160	3·373
∞	0·2533	0·5244	0·6745	0·8416	1·036	1·282	1·645	1·960	2·326	2·576	3·090	3·291